ON the occasion of the opening of the Carnegie Science Building at Acadia University, Wolfville, N.S., last October, Prof. H. A. Bumstead, of Yale University, delivered an address on the functions of a university laboratory. A reprint of the address is published in *Science* of March 11. After dealing with scientific studies from the disciplinary and ethical points of view, and urging that they are peculiarly adapted to the purpose of leading young men into the paths of careful, sensible, fearless, original thinking, he pointed out that laboratories have a much higher educational function to perform than merely to produce engineers or technical chemists or practising physicians; but Prof. Bumstead insisted most on the laboratory being a place for research. True research, real scientific pioneering, does not strongly appeal to the general public; its applications may be remote, it shows no immediate profit, its achievements are not spectacular, and are often too technical to be understood fully by any but experts. Thus it comes about that it must be encouraged and supported by the more enlightened fraction of mankind, and the chief agency through which this support may be given is the university or college. No other institution has been devised or seems likely to be invented which can perform the task so well. Research is not altogether a business, but an art as well, and that while organisation and division of labour may be the life of business, it is not the soul of art. To produce the highest results in scientific research there must be individuality and freedom, and there is room for far more individuality in a university laboratory than in any special research laboratory which has hitherto been established. Engaging in research is the best way and the only certain way for a teacher to keep himself alive intellectually and to retain his spirit and enthusiasm to the end. Even if the college he serves regards teaching and not research as its chief business, even then a professor must be given a reasonable amount of time and reasonable opportunities for research in order that he may keep his intellectual health, just as he is given time for physical exercise in order that he may maintain his bodily health.

WHEN we directed attention about two years ago to the second part of the first volume of the Journal of the Municipal School of Technology, Manchester, a volume of 130 pages of reprints of papers written by members of the staff of the school during the years 1903–7, we expressed doubt as to whether the output of research from the school was adequate in view of the fact that the staff numbered 100. The appearance of vol. ii. of the journal, which contains nearly 300 pages, and covers the papers published by the staff during the year 1908 only, removes all possibility of doubt on this score, and shows conclusively that the educational authorities of Manchester are alive to the importance of creating an atmosphere of investigation throughout the school. Of the sixteen papers reprinted in the second volume, three deal with pure chemistry, and form part of the series on the relations between outer form and chemical structure with which Prof. Pope's name is so closely associated; six deal with cotton, the staple trade of Manchester; five deal with electrical engineering and its teaching; one with mechanical and one with sanitary engineering. This list shows that the most important departments are all permeated by the desire to advance the subject with which they deal, and we may hope for a long succession of volumes from the school like the one before us. In the note referred to above regret was expressed that there seemed to be little evidence that the larger polytechnics in and about London, and the technical schools in the great towns of the provinces, *e.g.* Birmingham, Glasgow, and Belfast, adequately appreciated the importance of making themselves, above everything, centres of research for the solution of those problems which the highly specialised processes carried out in each district are constantly encountering. Far too many of the institutions of this type distributed over the country are content to record the thousands who have been taught elementary science within their walls, when the record is but one of their failure to do anything more than fill in some of the most conspicuous gaps in the education of those who come to them from the primary or secondary schools of the district. It is necessary to urge such schools to leave elementary-school work to the elementary schools, and to make themselves efficient as centres for the higher work of teaching and research in the subjects which bear on the principal trades of the district. May the example of Manchester spur them on to a better use of their opportunities.

SOCIETIES AND ACADEMIES.

LONDON.

Zoological Society, April 5.—Prof. E. A. Minchin, vice-president, in the chair.—R. H. **Whitehouse**: The caudal fin of the Teleostomi. The paper dealt with the structure of the caudal fin in about fifty different species of fishes, mostly Teleostei, and representative of nearly all the sub-groups. After each sub-group a few general remarks were added, and these were followed by a short summary of results dealing with definitions and the taxonomic value of the caudal fin.—T. M. S. **English**: Some notes on Tasmanian frogs. The paper was based on observations made during rather more than two years' residence in Tasmania.

PARIS.

Academy of Sciences, April 4.—M. Émile Picard in the chair.—The president announced the death of A. Agassiz, foreign associate.—Wilfred **de Fonvielle**: The theory of Fontenelle relating to the constitution of comets. The author maintains the possibility of Fontenelle's view that the comet acts as a gaseous lens, and discusses Kepler's objections to this theory.—J. **Haag**: The spherical representation of certain families of Lamé.—René **Arnoux**: The longitudinal equilibrium and curvature of the carrying surfaces of aëroplanes. The effect of increasing the curvature of the supporting surfaces is to increase the power of support, but, at the same time, the resistance to translation is increased, and the longitudinal equilibrium becomes unstable.—A. **Votton** and H. **Mouton**: Havelock's relation between double refraction and the index of refraction. Havelock's formula has been verified experimentally by Skinner and McComb for the magnetic double refraction of eight liquids, and the authors have also verified it for nitrobenzene. This formula is based on the assumption that the field modifies the distribution, but it is also consistent with the hypothesis that there is an orientation of the anisotropic molecules.—F. **Croze**: The prolongation of the band spectrum of nitrogen in the extreme red and the infra-red.—V. **Crémieu**: A systematic error limiting the precision of the Cavendish experiment. A new method for the study of gravitation. The error is caused by a supplementary couple resulting from the bending of the supporting wire. A method is outlined by which this error can be eliminated.—C. **Chéneveau**: The specific refractive powers or optical constants of dissolved substances in very dilute solution. An interference method was used, and the error due to differences of temperature in the two vessels discovered and eliminated. Ionisation does not appear to have any sensible influence on the refractive power of a dissolved substance in solutions of which the concentrations are more than 0·5 gram per litre.—Louis **Wertenstein**: The paths of radio-active projections.—A. **Besson** and L. **Fournier**: The reduction of the chlorides of boron and arsenic by hydrogen under the influence of the silent discharge. Arsenic trichloride is reduced, and a substance is formed the composition of which corresponds to $As_{11}Cl$; this may possibly be a mixture of arsenic and a lower chloride than $AsCl_3$. No subchloride of boron could be obtained.—J. **Bougault**: The acid-alcohols of conifers. Juniperic and sabinic acids. Juniperic acid was proved to be $CH_2(OH).(CH_2)_{11}.CO_2H$, and sabinic acid

$$CH_2(OH).(CH_2)_{10}.CO_2H.$$

Thapsic acid, extracted by F. Canzoneri from the resin of *Thapsia Garganica*, was shown to be identical with juniperic acid.—Marcel **Delépine**: Some organic compounds spontaneously oxidisable with phosphorescence. Eleven substances are described which possess this property, all having in common the group (S=C—O—).—E. **Voisenet**: The detection of hexamethylenetetramine

in musts and wines. The process is based on the fractional distillation of the acidified wine, followed by a colour test with albumen, hydrochloric acid, and nitrous acid. The latter is stated to be a specific test for formaldehyde.—P. **Vuillemin**: Materials for a rational classification of the *Fungi imperfecti*.—M. **Biéler-Chatelan**: A drainage effect.—H. **Bordier** and R. **Horand**: The action of the ultra-violet rays on trypanosomes. The action of the rays has been followed continuously under the microscope. The trypanosomes become rapidly granular, and their bodies, having the same refractive index as the surrounding medium, cannot be seen.—M. **Lecoq**: The toxic power of metalloidal arsenic. This is much less than that of corresponding quantities of arsenious oxide.—Emm. **Pozzi-Escot**: A bird of the runner family, confined to the high summits of the Peruvian Andes.—Charles **Nicolle** and L. **Manceaux**: The experimental reproduction of the pustule of the East in the dog. The possibly canine origin of this disease.—F. **Diénert**: The search for fluorescent substances in mineral waters.

DIARY OF SOCIETIES.

THURSDAY, APRIL 14.

ROYAL SOCIETY, at 4.30.—On the Viscous Flow in Metals and Allied Phenomena: E. N. da C. Andrade.—The Refraction and Dispersion of Argon, and Redeterminations of the Dispersion of Helium, Neon, Krypton and Xenon: C. and M. Cuthbertson.—The Action of the Radiation from Radium Bromide upon the Skin of the Ear of the Rabbit: I. O. W. Barratt.—A Physiological Effect of an Alternating Magnetic Field: Prof. S. P. Thompson. F.R.S.

ROYAL INSTITUTION, at 3.—The Himalayan Region: Dr. Tom G. Longstaff.

FRIDAY, APRIL 15.

ROYAL INSTITUTION, at 9.—The Chemical Significance of Crystal Structure: Prof. W. J. Pope, F.R.S.

INSTITUTION OF MECHANICAL ENGINEERS, at 8.—*Further discussion*: Compounding and Superheating in Horwich Locomotives: G. Hughes.—*Probable Paper*: A Research on the Hardening of Carbon and Low-tungsten Tool-steels: S. N. Brayshaw.

SATURDAY, APRIL 16.

ROYAL INSTITUTION, at 3.—Bells, Carillons and Chimes: W. W. Starmer.

MONDAY, APRIL 18.

ROYAL GEOGRAPHICAL SOCIETY, at 8.30.—Glacier Exploration in the Eastern Karakoram: Dr. T. G. Longstaff.

VICTORIA INSTITUTE, at 4.30.—Plato's Theory of Public Education in Relation to the Christian Doctrine of Human Nature: Rev. H. J. R. Marston.

ROYAL SOCIETY OF ARTS, at 8.—Modern Methods of Brick-making: Dr. A. B. Searle.

TUESDAY, APRIL 19.

ROYAL INSTITUTION, at 3.—The Modern Development of the Problem of Alcoholic Fermentation: Dr. A. Harden, F.R.S.

ROYAL STATISTICAL SOCIETY, at 5.

ZOOLOGICAL SOCIETY, at 8.30.—Notes on the Photophores of Decapod Crustacea: Stanley Kemp.—On the Varieties of *Mus rattus* in Egypt, with General Notes on the Species having reference to Variation and Heredity: J. Lewis Bonhote.—On an Example of Posterior Dichotomy in an Aylesbury Duckling: G. E. Bullen.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The Use of Reinforced Concrete on the Wabash Railroad, U.S.A.: E. R. Matthews and A. O. Cunningham.

WEDNESDAY, APRIL 20.

ROYAL MICROSCOPICAL SOCIETY, at 8.—(1) Critical Microscopy; (2) What did our Forefathers see in a Microscope? E. M. Nelson.

ROYAL METEOROLOGICAL SOCIETY, at 7.30.—Line Squalls and Associated Phenomena: R. G. K. Lempfert and R. Corless.—Daily Rainfall at the Royal Observatory, Greenwich, 1841–1903: W. C. Nash.

ROYAL SOCIETY OF ARTS, at 8.—Industrial England in 1754 (the Date of the Foundation of the Society): Sir H. Trueman Wood.

THURSDAY, APRIL 21.

ROYAL SOCIETY, at 4.30.—*Probable Papers*: The Incidence of Light upon a Transparent Sphere of Dimensions comparable with the Wave-length: Lord Rayleigh, O.M., F.R.S.—On the Improbability of a Random Distribution of the Stars in Space: Prof. Karl Pearson, F.R.S.—The Total Ionisation produced in Different Gases by the Kathode Rays ejected by X-Rays: Dr. R. D. Kleeman.

ROYAL INSTITUTION, at 3.—The Himalayan Region: Dr. Tom G. Longstaff.

CONCRETE INSTITUTE, at 8.—The Effect of Sewage and Sewage Gases on Portland Cement Concrete: S. H. Chambers.

INSTITUTION OF ELECTRICAL ENGINEERS, at 8.—Hydro-electric Installations of Sweden: A. V. Clayton.

ROYAL SOCIETY OF ARTS, at 4.30.—The Arts and Crafts of Tibet, and the Eastern Himalayas: J. Claude White.

ROYAL GEOGRAPHICAL SOCIETY, at 4.30.—Dewponds: E. A. Martin.

LINNEAN SOCIETY, at 8.—The Seedling and Adult Anatomy of *Welwitschia mirabilis*: Miss M. G. Sykes.—Anthomyidæ auf den Seychellen gesammelt: Prof. P. Stein.—The Dermaptera of the Seychelles: Dr. Malcolm Burr.—The Pteropoda and Heteropoda collected by the Percy Sladen Trust Expedition in the Indian Ocean: Dr. J. J. Tesch.—Die Pilzmücken Fauna der Seychellen: Dr. G. Enderlein.

FRIDAY, APRIL 22.

ROYAL INSTITUTION, at 9.—The Telegraphy of Photographs, Wireless and by Wire: T. Thorne Baker.

PHYSICAL SOCIETY, at 5.—Further Tests of Brittle Materials under Combined Stress: W. A. Scoble.—The Magnetic Balance of Curie and Cheneveau: C. Cheneveau with A. C. Jolley.

INSTITUTION OF CIVIL ENGINEERS, at 8.—The History and Present Method of Quay-wall Construction at the Port of Rotterdam: H. C. A. Thieme.

SATURDAY, APRIL 23.

ROYAL INSTITUTION, at 3.—Bells, Carillons and Chimes: W. W. Starmer.

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